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AUTHOR Bennich-Bjorkman, Li; Rothstein, Bo
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ABSTRACT

This essay examines the importance of university organization to its creative capacity, in particular how the research policies and organizational structure affect the creative capability of scientists. The argument opens by exploring possible measures of institutional success and creativity. There follows a discussion of creativity and insight in the social sciences. Some have argued that in the social sciences it is not possible to make discoveries. The essay argues to the contrary citing examples of social scientists' moments of creative insight. A further discussion looks at the place of the social sciences in the Swedish university. The nature of creativity is explored through psychological research on creativity and scientists. This section ends by noting that external evaluation may hamper creative thinking and that intrinsic motivation may be central to active creative work. Taking these observations, the essay goes on to suggest the best relationship between academic freedom, professionalism and creativity. This includes a look at how traditional universities in Sweden and Germany arose and were organized to foster creativity. Next the essay compares the Swedish university with innovative companies and concludes that, with study, the best institutional organization to foster creativity can be found. (106 endnotes) (JB)

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A CREATIVE UNIVERSITY: Is it possible?

by

Li Bennich-Björkman and Bo Rothstein

Departement of Government
Uppsala University

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A CREATIVE UNIVERSITY - IS IT POSSIBLE?*

Introduction

Freedom and independent mindness are notions associated with the scientific world. Freedom to guarantee that no truth, however unpleasant, is oppressed; and independence among scientists to guarantee that the most interesting problems are posed and the most creative solutions found.

In a description of values and behaviour prevailing among professors in the 1940s, Herbert Tingsten however provides us with a picture that does not correspond with the high-flying visions sometimes formulated on universities and scientists. With extraordinary pregnance, Tingsten, a well-known and prominent professor of political science in Sweden, depicts a milieu partly characterised by conservatism and conformism:

> Mostly it showed in little things: a certain eagerness to behave correctly, to show respect to persons in auhority, to be seated according to rank, to accept decorations with a touching mix of irony and joy. When Georg Andrén as minister of education visisted the Institute, I was surprised that everybody treated him a little different compared to when he was a professor; later in the Academy of literature I could observe the professorial reverence shown to the crown prince - the king[1].

"My university is a graveyard of lost places."[2] These words end a description of changes at the University of Lund by the outstanding geographer Torsten Hägerstrand. Hägerstrand points to the growing difficulties of meeting scientists from other disciplines since there no longer exists places for informal gatherings. He also describes with regret Saturday mornings in the stacks of the University Library, where he would spend a couple of hours orienting himself in unfamiliar subjects thereby giving rise to new ideas. That possibility is now gone. It has disappeared thanks fo formal rules on opening and working hours and not even a professor has the privilege any more of spending time alone among the shelves.

Both Tingsten and Hägerstrand focus on aspects of academic life that appear problematic: an exagerrated respect for authority and tradition, a well-developed sensitivity of status and hierarchy as well as a scientific isolation that seems to oppose the basic idea of research. But there is, of course, another side to research that touches upon the most unique and irrepressible within persons and bring out talents unknown.

Together, James Watson and Francis Crick discovered the structure of DNA, the double helix. In 1962, they shared the Nobel Prize for this discovery. Working close to each other in the Cavendish laboratory in Cambridge they constantly tried ideas on each other and kept a never ending dialogue going. Many times they were in error,

*This article is part of a recently started research-project financed by the UHÄ on Control, Organisation and Creativity in University Research.

but they kept attacking the problem from various angles. Competing with the physicist Linus Pauling in finding the solution first, they "lived the problem" day and night. In his memoires of that time James Watson describes the hectic atmosphere in the laboratory:"Francis then began pacing up and down the room thinking aloud hoping that in a great intellectual fervor he could reconstruct what Linus might have done."[3]

In contrast, Ragnar Granit, another Nobel laureate in medicine, stresses the need for solitude in the process of creation and points to the importance of withdrawing now and then:

> What I mean is that all important scientific results are born in such an "ivory tower," a creative centre inside where you listen to yourself, at times successfully so.[4]

How do these different pictures of the academic world fit together? How can it be, that an institution which cherishes tradition and hierarchy, at the same time can house passionate persons who solely recognize the authority of truth? Or to reformulate these reflections, does the traditional academic milieu really favour scientific passion at all? Issues like these are intriguing, partly since they indicate the paradoxical and dual character of universities as centres of tradition as well as of creativity and partly because they make you speculate about the possible influences of the environment.

In this essay, we have choosen to approach the puzzles indicated above by concentrating on the importance of the organisation at universities, since we are convinced that the ways in which research environments are organised and controlled are of crucial importance to their creative capacity. In what ways do research policies and structuring of the organisation affect the creative capability of scientists? We focus exclusively on research and thus exclude discussions on the universities´s educational tasks. Since the ideas presented are the basis of a recently started research project, at this point only questions can be raised.

In order to understand the way an institution works and be able to decide its degree of success, the use of an "evaluation" criterion is neccessary. Which criterion should be choosen to evaluate universities? The answer may seem obvious from the previous discussion. Neither efficiency nor profit are adequate measures. As Peter Blau states:

> It is the paradoxical responsibility of a university to find ways to institutionalize creative scholarship and research. Of course, only human beings can have original insights and make contributions to knowledge, and the creative imagination needed for original scholarship cannot be readily harnessed by bureacratic procedures.

Nevertheless, mobilizing scientific and scholarly creativity is a basic challenge confronting a major university, which meets this challenge by instituting conditions that stimulate and facilitate original research and scholarship at the frontier of knowledge.[5]

Therefore, creativity makes the best criterion. We believe it is necessary to pose the question whether or not the institutional arrangements promote creativity in university research? Are there ways to control and organise universities that are more conducive to creativity than others? Even though creativity is not the only interesting quality for university organisations it has without doubt come to be highly valued in science, as well as among artists, journalists and writers, all of which represent professions closely associated with the ability to create.

An opponent of this choice might object that creativity is not the only desired goal or value in research. Many other values exist like methodological skill, accuracy, a critical mind etc. Michael Polanyi points to these other values as opposed to originality when writing: "Both the criteria of plausibility and of scientific value tend to enforce conformity, while the value attached to originality encourages dissent."[6] A rather frequently occuring comment is that: a research institute can not make room for too many creative scientists. "Imagine what would happen if everybody were creative!" To a certain extent this is correct; there are other values than creativity that are essential in research. Our belief is, however, that in the long run creativity is the most crucial factor in determining the quality of research.

Lennart Philipson, head of the European molecular-biological laboratory in Heidelberg, discusses creativity and organisation when he devotes his contribution in a volume on creativity to an analysis of the "creative group."[7] He concludes that in an atmosphere where formal hierarchy is of no importance and discussion is totally free even average scientists can make creative contributions. It is the group, the milieu, i.e. the organisation that is worth focusing on, according to Philipson.[8] In an article Bo Gustafsson, professor of economic history and director of SCASSS, the Swedish Collegium for advanced study in the Social Sciences, strongly advocates taking into consideration the significance of the environment, the organisation, when discussing creativity.[9] The differences between institutes that "sparkle with life" and institutes which seem to have dozed off can, according to Gustavsson, not simply be explained with reference to individuals.

He writes:"There are certain environments that during long periods of time and under different regimes prosper while others continue their sleepy existence unaffected of the individuals passing through."[10] A similar view is

advocated by Torsten Hägerstrand who, much like Peter Blau, discusses the problems in combining the discipline and playfulness needed in doing research:

Considering that problem, it is worth pondering on the formulation by the British art philospher Gombrich: Ì do not think that the growing of good ideas can be organised, but it is not excluded that we can make conscious efforts to create a climate in which their growing is not restricted.´ If one adheres to this line of thought - and I think that is the only thing to do - the present task is to speculate in what keeps a creative climate alive.[11]

There appear however to exist few studies that address the questions of the relations between control, organisation and creativity empirically, at least when university organisation is concerned. Already in 1963, Calvin Taylor and Frank Barron in a study on scientific creativity pointed to the lack of research concerning the environmental conditions favouring creativity:

We are perhaps more in the dark about the environmental conditions which facilitate creativity than we are about any other aspect of the problem. Beyond obvious conditions, such as the need for ample time in which to work freely on problems of one´s own choice, little is known....Research , then, on the *general environmental conditions* - cultural, professional, and institutional - conducive to first-rate scientific research needs major encouragement. We are aware of no area in the social sciences where research is simultaneously so vitally needed and so sadly neglected.[12]

Since then, not very much seems to have happened. Björn von Sydow, during the latest Social Democratic government in Sweden responsibile for research policies, indicates that he would welcome more studies that "convincingly show which ways of financing and decisionmaking that are most favourable for improving quality, originality and efficiency in research."[13] Referring to her own study of graduate programs in four disciplines, Birgitta Odén, who is professor emeritus of history at the university of Lund, agrees with von Sydow: " My hypothesis is that we actually know less about what constitutes a good critical and creative graduate program than what should be acceptable in an area which is the subject of reform."[14] These statements indicate, in spite of the obvious importance of the problem, that a profound lack of knowledge exists as to what favours creative research. They also indicate a belief in the possibility of approaching questions of creativity in universities in a more systematic fashion. Our aim is not, however, to cover the university organisation as a whole. Instead, we would like to raise some questions with respect to the present situation of the social sciences in Scandinavia, and at times contrast them with other scientific areas.

Social Sciences - are they different?

Sometimes it is said that the social sciences differ from medical research and the natural sciences in that it is not possible to make discoveries. We believe in contrast, that creativity is as important in the social sciences as

elsewhere in the scientific world. Discoveries are also both possible and highly desirable when society and individuals instead of nature are being studied. One example is the story told by Rollo May, the american psychologist, who portrays a moment of revelation in his early research on the meaning of agony. He was studying agony in young unmarried mothers in New York City guided by, as he puts it, some hypothesis "approved of by my professors as well as by myself." The state of agony should have a direct relation to what degree the young mothers had been rejected by their mothers during childhood. However, a large part of the young women, though they had been strongly rejected, did not show signs of particularly deep agony. May tried to figure out what was wrong with them but almost gave up, feeling that he was facing an insoluble problem:

> Late one day I put by books and papers aside in the small office I used at the maternity home and walked down the street towards the subway. I was tired. I tried to put all thoughts on the tricky problem aside. When I had almost reached the entrance of the Eight Street-station it "suddenly hit me" as the saying goes, that the young women not fitting my hypothesis *all belonged to the working class.* As soon as this thought suggested itself other ideas followed. I hardly think I had taken another step as a totally new hypothesis emerged. In that moment, I grasped that the original trauma causing the agony is not the rejection by the mothers but *a rejection that you lie about.*[15]

Rollo Mays account of how a major insight hit him serves as a striking example. Karl Deutsch´s John Platt´s and Dieter Senghaas´ pioneering and important article on breakthroughs in the social sciences during the 20th century[16] is even more convincing, since it decidively rejects the idea of the social sciences having a different nature in this respect.

Deutsch, Platt and Senghaas have studied 62 accomplishments in the social sciences during 1900-1965, which they consider the most influential. They list such different discoveries as theories and measurement of social inequalites (Pareto and Gini), intelligence tests (Binet, Terman, Spearman), functional anthropology and sociology (Radcliffe-Brown, Malinowski, Parsons) and the contribution of Gunnar Myrdal on theories of economic development.

Generally, they conclude three things:

1)"there *are* such things as social science achievements and social inventions",

2)"these achievements have commonly been the result of conscious and systematic research and development efforts by individuals or teams working on particular problems in a small number of interdisciplinary centers",

3)"these achievements have had widespread acceptance or major social effects in surprisingly short times".[17]

In conclusion, convincing proof exists that discoveries certainly are possible. However, we think that vast differences might exist in the disciplines in the way discoveries are allowed to reshape or influence traditions of

knowledge. This might be a consequence of the existence of paradigms in the natural sciences[18], compared to the prevalence of relativism within the social sciences. This "relativism", sometimes referred to as multiparadigmatic which seems to be a contradiction in adjectio, could be valuable in the sense that it presupposes greater tolerance towards different approaches and interpretations. However, as has been observed by Herbert Marcuse in his formulation of "repressive tolerance", too much freedom and too much tolerance is detrimental to the creative process, since the element of challenge disappears. Explanations of this kind, which focus more on scientific traditions than on organisational or institutional factors, try to depict what Barron and Taylor once called the "climate of the scientific profession."[19] Even if they fall outside the immediate focus of our study, they are of great interest to us and we will return to these aspects.

Social Sciences - are they problematic?

In the latest Swedish government bill on research, a very cheerful picture of the university research system is outlined:

Taken together, the bibliometrical studies show that Sweden has a growing quantity of research with a strong international reputation and a rapidly expanding international cooperation in the scientific field. This strongly depends on the fact that Sweden is among the countries that has made the largest contributions to R&D. It is also a sign of the well-being of the Swedish R&D-system as compared to many other countries.[20]

In this approach, no attempt is made to separate the different disciplines nor to lay bare variations in quality. To some extent this may be explained by the fact that these are delicate questions that are bound to upset those concerned. But according to some other observers there are great differences among the various academic fields and the social sciences are problematic: "Several factors indicate that there hardly exist any reasons to be content with the quality of research being done in the Nordic social sciences"[21] says the author of a report on social sciences in the Nordic countries and thereby seems to treat all countries alike. Professor Erik Allardt has formulated it by saying that the "golden days of Nordic social sciences are over."[22] An impression which differs a bit is given by the sociologist Edmund Dahlström who does not seem to judge the situation equally harsh in all countries. At least in the discipline of sociology he considers Norwegian scientists to be ahead of others:

If I am to compare the sociological research in the Nordic countries, I find the Norwegian to be the most creative. If I was to deliver an explanation, I would point to the fact that Norwegian sociology has been able to

attract some extremely talented and competent researchers such as Johan Galtung, Vilhelm Aubert, Stein Rokkan, Nils Christie, Sverre Lysgaard and others. Furthermore, I think that in Norway an adequate institutional framework has been created in for example the Institutt for samfunnsforskning[23].

Is is worth noting that Dahlström underlines an organisational factor- the creation of an institute.

Looking at Swedish university research as a whole the picture is not clear-cut. On the one hand the social sciences appear to be in a kind of a rut, while on the other hand the medical research is quite prosperous and highly esteemed internationally. A measure by which to illustrate this difference is the method more and more often used to compare the rate of international publication and citation. We are aware that this method is not without its problems for measuring quality and especially creativity but so far we have not found any better alternatives.

One major drawback that should be mentioned is that the tradition of publishing articles is much more wide-spread in medicine and the natural sciences than in the social sciences. This limits the desirability of using the quantity of publications and frequency of being cited in comparing the different disciplines. Nevertheless it still could be used for illustrating variations within disciplines, either within a country or when comparing between similar countries such as Sweden and Norway. However, here we will use it in the former, less appropriate way, just to hint at the differing international standing.

It can be shown that when using these bibliometrical methods, the social sciences, at first treated as a unit, rank far below especially medical research. Medicine and bio-medicine both have high shares of the international production of articles in their respective field. Clinical medicine has a share round 3% and bio-medicine around 2%. [24] None of the social sciences, neither as a group nor individually, reaches a position close to the ones of medicine. An average figure is around 1%[25] with great variations between different fields. Regional planning (geography) scores fairly high while political science takes a very modest position.[26]

What explanations have been introduced so far as to why the social sciences find themselves in a difficult situation? It has been suggested that the ties between social sciences and both the state and societal interests became too tight during the 1960s and1970s. Through emphasis on "pragmatic" kind of research some of the social sciences came to be too closely associated with state authorities making research become more of an assignment ordered from "above" than critical investigation born in the mind of the scientist him or herself. [27]In Sweden, sectoral research has been quite wide-spread, while in Norway it has been less popular.

Another explanatory factor might be the fragmentary way of functioning that has become characteristic of the social sciences:"This often results in apperently large research environments functioning in very fragmentary ways - the intellectual fellowship and the communications are weak".[28] This specialisation could also serve as an excuse for the considerable relativity in the social sciences as compared to the natural sciences as to what is actually true. Discussions on different organisational frameworks however seem to be lacking. Before proceeding to investigate what has been done on organisations other than universities, the problem of creativity need some lightning.

The nature of creativity

How are we to define and understand creativity? This question is crucial but at the same time difficult to answer in an unambigious way. Creativity is closely associated with an ability to construct new concepts, theories and new interpretations of society or nature and especially in new ways of connecting theory and data. But what are we actually referring to? "New" or "different" is not sufficient; several researchers have emphasized that to be considered creative, a product must be useful and "realistic."[29] The new idea "must correspond to some extent to, or be adaptive to, reality."[30] Any caprice would not do even if it is considered original. To merit the label creative the solution has to be appropriate and "good", and the creator has to embark from already existing knowledge. The Swedish professor Sören Halldén once wrote about the ability to "perceive what is still to be observed."[31] To be in a position to do that, you have to know a great deal about what is already known. "You have to know a lot about the old to see the new,"[32] indicates that creativity is often associated not with ignorance but with familiarity with the area of interest. "To be creative the creator has to master the area which he wants to renew,"[33] writes Mihály Csikszentmihalyi and thereby indicates the complexity of the tasks facing universities. At the same time universities pass on traditions and knowledge, while putting these traditions into question. The insight that expertise or mastering of the already known is necessary for pioneering work, is also present in Thomas Kuhn´s analysis of scientific revolutions .[34] It is possible to interpret his conclusions about normal science so that the upholding of scientific traditions is almost explained in a functional manner. They "serve a function", since they provide scientists with the necessary background for being able to acknowledge the new pioneerering work.

Maybe we do not have to describe creativity more precisely, since it is a phenomenon that most certainly provokes profound differences of opinion at the conceptual level but seems less troublesome to agree upon on in reality. In several studies, confronted with the task to single out creative persons among a population of, for example, architects or writers, the "experts" (people with long experience in the field) reached a high or very high degree of consent in their judgments."Furthermore ... creativity is something that people can recognize and often agree upon, even when they are not given a guiding definition,"[35] writes Theresa Amabile, one of the more outstanding researchers in the field.

But what is creation? What actually happens when an architect, a writer or a scientist constructs, writes or thinks in a new manner? What characterises persons considered creative? Barron writes:

The problem of psychic creation is a special case of the problem of novelty in all of nature. By what process do new forms come into being? The specification of the conditions under which novelty appears in human psychical functioning is the task to which the psychology of creativity addresses itself.[36]

When researchers in psychology after 1950[37]began to show interest in the psychology of creativity instead of exclusively focusing intelligence and genius, it was the creative personality that attracted most attention. The insight that an high IQ did not always coincide with high creative ability seems to have provoked an absolute explosion of research into the creative personality. Qualities like courage, self-centredness and non-conformism as well as independence and non-conventionalism were presented as typical of the creative person.[38]

A large element of discovery orientation, i. e. an interest in finding problems rather than concentrating primarily on solutions, has also been pointed to as a typical trait of the creative person.[39]

In a article focusing on scientists, Catell and Drevdahl showed that the successful scientist differed from the control groups, academic teachers and academic administrators, in that they were more independent and radical, more dominating and emotional and also had a weaker super-ego.[40]

A very interesting result, confirmed also by scientists themselves, is the significant role played by intuition in the work of creative persons like scientists.[41] When James Watson describes one of the many errors made on the way to DNA he recalls "at once I felt something was not right."[42] Charles Darwin portrays the emergence of his theory of natural selection in a similar way. It struck him"at once" when reading Malthus and the "idea came to

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him as a flash of intuition a flash which needed further research to be confirmed."[43] There are several examples pointing in the same direction; a famous one is Henri Poincaré´s account of the discovery of the "fuchsian functions," an extremely important mathematical discovery, which took place in a a sudden flash of lightning when Poincaré was entering a bus. At once, he was convinced that the solution was the right one.[44] Intuition is associated with emotions, and maybe creative persons are not more intuitive than others, but probebly they are more open-minded and unprejudiced, thus partly accepting being guided by convictions and emotions rather than "rational consideration".

Gudmund Smith is another researcher in psychology who has taken a particular interest in studying scientists. His tests are interesting, since among other things they make it possible to distinguish different kinds of scientists from each other.[45] In a test made on younger sicentists - defined as doctoral students about to complete a dissertation and recently graduated researchers - Smith and his collegues found that the scientists under investigation could be grouped in three separate categories.[46]

The first one included efficient and intelligent researchers (group 1), the second consisted of imaginative and independent persons (group 2) and the third was composed of scientists who are learners of methods but lack both energy and imagination (group 3). The third group is of little interest here, since the persons were not considered successful according to any standards. However, the two remaining groups are highly interesting. Smith stresses some vital factors separating them. In group one the researchers are efficient but not particularly imaginative or original. They are dependent on impulses and stimulus from outside to get new ideas. The scientists in the second group present the opposite pattern. They are highly inventive but not always efficient or productive. They experience ideas as emerging from inside. While the scientists in the first group do not consider science to be actually different from other qualified professions and experience few or no moments of inspiration or intuition, members of the second group are deeply emotionally involved in their research and regard an "inner, subjective dimension as the source of ideas."[47]

The attitude expressed by the not so creative about the similarity between research and other qualified tasks is not unusual among scientists as a way of escaping the element in research impossible to control by mere skill: the ability to break loose from traditions and grasp yet unknown patterns. In this respect, it is impossible to

imagine a scientist becoming professional in the sense that doctors,lawyers or engineers successively improve their skills.

Of great significance is the evidence shown in Smith´s study of the deep emotional involvement among members of the creative group (group 2); something that distinctly separates them from the other categories. The committment shown is also related to the agony that many in the creative group sometimes felt in their work.

Closely related to Smith´s findings, though she approches the problem from a different angle, is the psychologist Teresa Amabile´s quite extensive research on social psychological factors and their influence on creativity.[48] Amabile focuses on "the social conditions that are most conducive to creativity,"[49] and her major conclusion, based on several empirical tests with creative and less creative persons, is that the degree of *intrinsic motivation* is strongly related to creative performance. If the motivation for a task derives from elements outside like monetary reward, fame, career-making and so on, Amabile shows that the problems and solutions chosen by the test persons are judged as less creative than in the case where the motivation stems from a genuine interest from within. "Intrinsic motivation is conducive to creativity, but extrinsic motivation is detrimental. In other words, people will be most creative when they feel motivated primarily by the interest, enjoyment, satisfaction, and challenge of the work itself - and not by external pressures."[50] Among other things, Amabile shows that it is possible to manipulate the persons tested so that they become less creative when starting to think about extrinsic motivations for their work. She describes an example were writers judged as highly creative came to a test and were asked about their reasons for writing. All of them gave intrinsic reasons. When the test started they were instructed to consider what extrinsic reasons motivated their writing, and Amabile claims that this mental influence lowered the degree of creativity in the poems they wrote during the test.

> People who had been writing creatively for years, who had long-standing interests in creative writing, suddenly found their creativity blocked after spending barely five minutes thinking about the extrinsic reasons for doing what they do.[51]

Results showing the importance of intrinsic motivation with respect to creative performance could, moreover, very well be compared to conclusions demonstrating the significance of intrinsic motivation and curiositity in learning processes.[52]

Amabile has succeeded in showing another crucial factor, namely that external evaluation or expectance of external evaluation is negatively related to creative performance. [53] According to Amabile this occurs when heuristic tasks, which she defines as "open-ended" tasks, are concerned as opposed to algorithmic tasks where

the solutions are clear and straight-forward. In the latter case, external evaluation can improve performance, but heuristic tasks are superior in provoking creative solutions while the expectation of external evaluation reduces the courage to be creative. The fact that you know you are going to be evaluated from outside makes you more bound to stick to traditional ways of problem-solving.

Creativity, Academic Freedom and Professionalisation

We consider Amabile´s findings on the role played by intrinsic motivation and the detrimental influence of external evaluation to be very important in an organisational context since they clearly point to factors that could be aggreggated to an organisational level. Her conclusions are supported by others as well. Pelz and Andrews, in a comprehensive study on organisational factors favouring scientific inquiry, stress the importance of inner motivation for creative performance, and the destructive influence of goal-setting from outside (chiefs, superiors etc). Their study also provides more support for the conclusion that deep emotional involvement is conducive for high performance.[54] "Scientists - that is, creative scientists -spend their lives in trying to guess right. They are sustained and guided therein by their heuristic passion"[55] writes Michael Polanyi and again emphasises the importance of emotion and passion.

Could it be that we now possess the first clue as to what constitutes a creative research environment? Are differences in creative potential between disciplines, institutes or faculties in some way related to possibilities for the individuals working in the organisation to keep their intrinsic motivation and curiosity? In what ways does the structure of university research, where the professional career-making appears to be extremely present as a motive for work and external evaluation is the life-blood, influence such possibilites? Tensions between the need of and desire for creativity and the autonomy of scientists as well as the development of research into a regular career are also, historically speaking, apparent from the beginning. Consequently, the process of professionalisation of scientific work taking place in the universities provides us with yet another key to the built-in contradictions in the university organisation between on the one hand independence and freedom of thought and, on the other, a preoccupation with status and hierarchical positions.

Starting in Germany in the early 19th century, the idea of a "research university"successively gained ground and replaced the older universities which primarily functioned as centres of education.[56] From a loosely structured

existence where research was "mostly practised by amateurs in the same way as in art and literature"[57] or conducted in learned societies or academies[58], science became organised and incorporated in an organisational framework, controlled by politicians and bureaucrats as well as by scientists themselves. When the first universities of this new kind were established, of which the Berlin University (1810) probably is the most well-known, they "were initiated by intellectuals, and their original shape was determined by the needs and the ideas of this group."[59] The German intellectuals, whose position till then had been quite weak, wanted to raise their status by raising the status of universities. Joseph Ben-David has written very interestingly about the problematic process of building an appropriate university organisation in early 19th century Germany; problematic since the only organisational models existing were the military, the civil service and the Catholic and Lutheran churches "and none of these seemed suitable for scientists."[60] They were all strictly hierarchic as well as autocratic, and these qualites seemed hard to combine with creativity. How was this dilemma solved?

According to Ben-David, the new organisation created to suit the research university was based on three premises, of which the third one is the most interesting in our context. Primarily, the scientist should work alone and not be a member of a group and secondly his contract implied only teaching and examination. Thirdly, and most certainly to avoid the danger of conformism inherent in career making, "scientific research was not to become a career for which one was regularly trained, but a calling for which one prepared and devoted oneself privately."[61] The very best of the teachers/researchers could be rewarded by paid positions, but more as an honour than as a step in a career.[62] The idea of a "research training" a graduate- or Ph. D-program thus seems to represent an opposite view, as does the idea of research as a professional career. Thus, already from the start there existed a consciousness of the importance of organisation and the dangers of bureaucracy and professionalisation to creativity. The German organisation mentioned by Ben-David was obviously aimed at avoiding too many regulations as well as a system based on successive promotion - an institutional career. Still, a development towards a professionalisation of science was what happened, in spite of the original precautions.

Partly, this can be explained by the fact that the old academic corporations were given responsability for safe-guarding academic freedom and handling academic affairs, while the state appointed professors and financed the universities.[63] The establishment of academic self-government was not self-evident, but there existed few alternatives at the time, and though the academic corporations were considered conservative and backward, they were the best candidates present. Ben-David declares:

The corporate structure was not chosen for its flexibility and efficiency, and, indeed, as will be shown below, it was neither flexible nor efficient. It is very doubtful, therefore, that academic self-government contributed positively to the adaptability of the German system.[64]

The academic freedom, the self-government of scientists on crucial scientific matters, is an interesting phenomenon when discussing creativity. Even if the right to decide the overall structure has been given to political authorities, academic autonomy is firmly established and has served as model for other professions. Theoretical discussions - with a normative emphasis - have abounded on the question of academic versus state (or societal) influence. [65] But it seems more unusual to question academic autonomy from a creative point of view. For our purpose this is however the most interesting problem to discuss. If it is generally believed that academic self-government is the best way to secure values such as tolerance and broad-mindedness, a few historical examples can serve as counter-evidence.

Ben-David shows that the ministry "had to interfere in university appointments in order to override decisions of university senates motivated by prejudice and vested interests."[66] Another German example is the fact that the famous and pioneering historian Leopold von Ranke, professor at Berlin University, was forced on the university by the political authorities, against the expressed will of the faculty.[67] When the idea of establishing research councils in Sweden was initiated in the 1940s by some researchers, [68] many professors reacted in an hostile way and worked actively against such a new organisation. Georg Kahlson, professor of medicine and one of the most energetic advocates of a research council in medicine recalls: "The medical research council was established in December, 1945. It is interesting that the opponents had many allies among the professors. They claimed that the research councils constituted a threat to the academic freedom of searching for truth".[69] However, the political authorities were interested in the idea, which according to Birgitta Odén contributed to its successful implementation.[70] Finally, a provocative observation on the American research organisation delivered by the already cited Björn von Sydow should be mentioned. He claims that one explanation for the success of American research is that issues concerning research in reality not are decided upon by the university researchers but by the university boards and the president or the vice-chancellor.[71] Furthermore, von Sydow seems sceptical of the Swedish faculties´will to act liberally, and believes that research councils are necessary to bring about greater innovation.

These examples show that the influence of the scientific community, as well as of the political authorities, in promoting creativity can not be anticipated mechanically. In a self-governed organisation, the researchers have many interests to protect besides the quality and novelty of research, while the political authorities, in contrast, can often act in more clear-cut ways.

At least nowadays, the Swedish political authorites seem to emphasize the need for university research to be novel and creative. Recent statements on research policy stress the need for "new knowledge", "new methods", yes even clearly express the need for originality and creativity in university research .[72] The latest Swedish government bill on research underlines the research councils significance as agents promoting innovation as compared to the faculty organisation.[73] The bill even implicitly criticizes the universites, which are sometimes said to care so much about the existing organisation and the already employed researchers, that they ignore new ideas. As a remedy to cure this ill, the government suggests a special allowance destinated to vitalize the research climate: "Those who receive this allowance should be able to institute creative environments for research, thereby making it possible to produce scientific results of high international standing".[74] Again, the sceptisicm towards the faculties´actual will to promote creative research is shown.

Today, creativity thus seems to be on the political agenda, but it is strange that this should be a rather newly awaken interest. In earlier documents, discussions on the creative potential are remarkably absent, other than on a very superficial level. Why is that?

It could be related to the strong position of scientists and the academic freedom, that makes it very hard to in any way imply critique or suggest anything that by suspicious minds could be interpreted as control. Since the claim of autonomy rests on the implicit precondition that self-government is the best way to guarantee the birth of new knowledge, creativity is a very delicate question to discuss. But it even seems like there is often a reluctance to understand the special conditions that foster creativity. The famous researcher on cancer, Georg Klein, was a member of the Swedish government´s special research council[75] during the 1970´s and recalls a discussion on creativity where the government members in an almost annoyed manner considered the researchers talk on creativity elitist.[76]He expresses some doubt to the possibilites of research policy: "When it is really bad, an unconscious reluctance is developed against the dynamic creative scientist´s most important qualities: the open-mindedness for the unexpected, the courage to leave a well-planned and carefully prepared track to follow a not previously assumed path, perhaps discovered by mere coincidence...."[77] Obviously, politics and science are not

the easiest entities to unite and they still have to since political actors have an important amount of control over universities, a control they share with the scientists themselves. In conclusion, the balance between political influence and academic autonomy is a question of great interest to us, and one that we consider related to the creative potential of universities.

Academic self-government is not the only element making universities into a perhaps overly rigid and unflexible organisation for creative research. Another crucial development was the professionalisation of scientific research, i. e. the making of research into a career.

The transformation of science into a status approaching that of a professional career and into a bureaucratic, organized activity took place in Germany between 1825 and 1900.[78]

While the professionalisation began in Germany it was in the United States that the idea of research as an occupation, a profession, really was implemented. The thought cherised by the German system of science as a calling or a mission in life did not fit the Americans.

When research oriented universites were introduced in USA in the end of the 19th century, a formal graduate education wa also introduced[79]. This was clearly an important innovation and one opposed to the earlier thought of research not being a regular career. Gradually, scientific work turned into a more specialised activity with different disciplines and special training with the result that scientific researchers became more career-oriented.

But how does the core in the process of professionalisation, the idea of an existing body of professional knowledge, combine with the aim of creativity, where insecurity, risk-taking and doubt are major elements? Professionalisation of research may have contributed to creating necessary conditions for adequate training of future scientists, but graduate training at the same time, as Birgitta Odén shows, aims at introducing students to values, rules and norms that functions in a constraining, or sometimes even authoritarian, way. [80]

The Scandinavian countries to a large extent adopted the German way of organising research with one-chair institutes, i. e. with one professor leading an institute with subordinated senior and junior researchers. In the USA , a much more egalitarian and collegial way of organisation was established, with departments consisting of many professors instead of one, all working on an equal basis.[81] Academic authority changed from extremely personal to more of a peer system, and the size of the departments were so big that specialities could exist side by side:

The size of the American department and the presence of a number of professors within it made possible the growth of the department, and within the department the formation of independent research units composed of one or several teachers and graduate students.[82]

What has it meant for the Scandinavian universities, from a creativity point of view, to for a long period of time have an organisation greatly modelled upon the German one? This is an intriguing question as well, but could hardly shed light over differences between e g social sciences and medicine in the same country. Instead, it is most adequate to pose when dealing with general differences between countries.

Innovative Companies and Creative Universities

The almost onehundred-year old combine is no giant but a traditional, well-managed organisation. The philosophy of the management is efficient production with high quality. New production works and production processes are continuosly introduced. A few very profitable products are essential for the result. Technically the organisation is strong and the engineers are its elite. The power and energy of the organisation is centred round the production process, where efficiency usually demands the presence of an hierarchical structure and a centralized decisionprocess. The view of the individual is guided by the prerequistes of the production technology. The situation on the market is however beginning to look problematic though the products are of high quality. The profitability is slowly falling. Nothing alarming, but an understanding is spreading that something is wrong with the dominant view of the management. Without the organisation being in a real crisis, during the early 1970:s a scrutinizing of the basis of that view begins. The process is very slow. The dominant values are firmly rooted and production continues to govern thinking, management is performed by orders and the employees are controlled from above. It takes almost ten years before a more general insight about the need for a new view of management is reached.[83]

Is this a fair description of the Swedish universities today? To be certain, the university is traditional. It is, as has been mentioned above, hierarchally organised, modelled on the old German system. It has some successful areas of research such as medicine which correspond to the profitable production, while other research areas such as the social sciences are more troublesome.

However, this is not a description of the university but of a big Swedish chemical company, solid but with problems of innovation. A comparison between companies and universities is not so far-fetched as it may seem and it is becoming more common among researchers interested in company performance to focus on organisational factors in order to explain why some environments are producing more creative and innovative results than others.When discussing organisation and creativity these results might be of great value.

Companies work under different conditions than universites, since they compete directly in a market and are literally forced to innovate in order to survive. Another important difference is the multiple tasks universities have to accomplish: at the same time train future professionals as well as account for a significant part of a country´s research. At least in Scandinavia, which is of primary interest here, universities are not only controlled by a university manangement but by political authorities as well. The control levels are thus more than for a company. There are however important similarities as well. Many of the companies investigated have a "research-like" organisation with highly professional and skilled employees. For these companies, e.g. electronic companies and computer firms, the crucial factor for success is not machines or even capital, but the innovative capacity of the employees.

Without their creative and innovative abilities, these companies soon loose ground in the market. Thus, the company management has to devote a lot of time and interest on creating an innovative climate. In a longterm perspective, the capacity for creativity should be equally interesting for the universities, since they work under much of the same premises. Companies and universities also have one essential element in common: the presence of an organisational framework.

A study on creative organisations states that "(i)nnovation in a large organization rarely happens by chance. It has to be organized,"[84] thereby strongly underlining the point made by us. In many of the reports on innovative companies the organisational factors are also underlined. In his studies on the preconditions for creativity in electronic companies, Bengt-Arne Vedin shows the importance of organisational factors in determining the success or failure in this rapidly changing and highly innovative line of business,[85] where new products are introduced "at a rate that technical journals find difficult to keep up with. For a computer company, this might mean a new product every or every other week, for a semiconductor circuits firm every or every other day ...."[86] Everything is happening at a breakneck speed: it is hard imagining new ideas in a parallell way emerging from the university every other day or week!

The great attention attached to organisation in these successful firms is striking. Vedin in particular stresses the importance of an elaborated company "culture" or climate in explaining the extreme innovativeness:

> In performing this investigation two factors that I had not anticipated beforehand seemed to have an important influence on the innovativeness and the organizational structure of the companies under scrutiny: company climate or culture ....[87]

A similar line of thought seems to be the guiding idea behind Terrence Deal´s and Allan Kennedy´s *Corporate Cultures*, (1982). The authors are not explicitly concerned with innovation but rather with the wider concept of company success. But like Vedin, they point to the significance of corporate culture, which they identify as a major key to failure or success.[88]

Organisational researchers concentrating on innovations and creativity seem to agree on the importance of climate or culture with respect to creativity. "The corporate climate highly influences the innovative capacity of the company,"[89] claims Sören Sjölander, a researcher dealing with problems of organisation and innovation.

How should culture or climate - notions apparently closely related - be defined in this context? It is a complex phenomenon and one that is not easily measurable. The concept of climate is composed of the values, attitudes and goals prevailing in a company as well as of the working style: "The climate is defined as the behaviour, attitudes and emotional ´moods´ characterising life in the organisation".[90] In studies concerning organisation and innovation the Swedish researcher Göran Ekvall has developed a framework aimed at capturing the climate within an organisation.[91] The factors observed in his model e. g. degree of freedom, degree of challenge, of risk-taking, of playfulness, are aimed at measuring the creative climate within an environment. Ekvall´s framework for evaluating the status within different companies or workplaces[92] is based on psychological and organisational findings on how creative persons work and what conditions are favourable to creativity. Using this method, Ekvall manages very well to distinguish between sections of a company that are innovative and those becoming stagnant.[93] Through this method it is also possible to identify the troublesome variables. The "climate model" is thus a very good tool in outlining the climate in an organisation on a descriptive level. The concept of "corporate culture" mentioned earlier can be interpreted as something very closely associated with the climate, perhaps even the same thing.

By identifying the climate within an organisation with particular reference to variables conducive to creativity it is possible to decide whether the organisation is of a more innovative or of a more positional character. When introducing this simple but useful dichotomy Harry Nyström declares: "Companies which emphasize stability and continuos operation are called positional companies, and companies which stress dynamic, discontinous development, innovative companies."[94] These terms also seem useful when discussing university and research.

Of the climate variables important for creativity we have, very briefly, mentioned a few such as freedom, challenge, playfulness and risk-taking. There are other: Vividness, idea support, trust and debate.[95]Among these, one seems to be extraordinary significant. It is the variable of risk-taking.

Risk-taking, the ability to institutionalise failure and to incorporate a large amount of uncertainty into an organisation, is in theoretical as well as in empirical studies intimately linked to corporate creativity. We believe that it is also highly relevant in the university perspective and something of a key factor in distinguishing between different institutes and disciplines.

A very important result shown by Ekvall is that among the eight climate variables mentioned, the largest difference found between innovative and positional companies concerns the risk-taking factor.

However, the strength of variance differs significantly between the dimensions. It is largest in "risk-taking" and smallest in "debate". It is well-known that creative and innovative conduct implies risk-taking. A large effect in this variable is thus no surprise. Not as evident however is that the mentality of risk-taking could be the most crucial climate dimension, which the results indicate.[96]

This conclusion, based on empirical studies of many companies of various kinds, is strongly supported by experiences from successful and innovative companies such as 3M.

3M is known as a company with a good climate for innovation.[97] The reason for this seems to be that risk-taking is systematically encouraged by the company management who considered this to be the best method for establishing the creative atmosphere needed for product innovation. An internal slogan often cited is "failure is OK," and failure is actually supported by "legends" told about company heroes failing and failing when trying new ideas and in the end succeeding. A carefully planned positive atmosphere towards introducing new ideas also exists:

If you want to stop a project aimed at developing a new product, the burden of proof is on the one who wants to stop the project, not the one who proposes the project. When you switch the burden from proving that the idea is good to the burden of proving that the idea is not so good, you do an awful lot for changing the environment within the company with respect to the sponsorship of entrepreneurial people.[98]

Compare this description with a typical seminar at a university institute, where the "critical" ambitions often creates a climate of ungenerosity, not to say reluctance to accept new ideas.

Are these results on risk-taking and built-in insecurity in companies of interest when studying creativity in research? Our answer is definitely yes, since the problems facing "innovative" companies and research institutes and universites seem similar. In order to establish a creative environment, there must exist room for mistakes so

that failure does not become totally detrimental to the individual. Earlier, we mentioned some possible differences in creative ability between, on the one hand the social sciences and the medical research and natural sciences in Sweden, and on the other hand between social sciences in Sweden compared with Norway. These differences could be related, as in the case of innovative and positional companies, to variations in attitudes towards risk-taking that are also closely connected with another important variable, challenge:

> In some ways, what distinguishes great scientists is that they make a lot of bets in uncertain circumstances (their "originality") and a lot of those bets turn out well (their "competence"). But if even a great scientist makes a lot of bets in uncertain circumstances, he or she will lose a lot.[99]

Clearly stated, the element of uncertainty is very present in science as well as in business. There is reason to suspect, however, that at least some of the social sciences are characterised by too little "trial and error". In other words, it is too risky in some university milieux to take risks and to actually introduce a truly uncertain hypothesis, which would be hard to cover-up if it failed. The way that certainty is favoured in Swedish social research is alluded to when Åke Andersson, a social scientist himself, stresses the need for a more generous policy from the research councils. Today, he claims, you are almost required to know the results when applying for money.[100]

He also underlines, based on research results, the significance of allowing for a great deal of uncertainty:

> The other necessary element is *structural instability* or genuine uncertainty. A feeling has to prevail that the discipline is instable and that new efforts could lead to a very strong change of the pattern of knowledge.[101]

The sense of risktaking within an organisation is thus probably a good indication of the degree of creative climate. Sofar, we have only been able to describe the climate, and maybe isolate the most crucial factors. However, we are also interested in explaining differences found between disciplines or institutes.

One possible explanatory factor has already been mentioned: the climate of scientific profession and the relativism or lack of actual confrontation we believe characterises the social sciences to a higher degree than both medical research and the natural sciences. The relativism we are referring to is not to be identified as relativism with respect to quality but with respect to what is most in accordance with reality, the question of truth. We believe that in the social sciences quality is sometimes judged as something separated from truth. In other words, the question whether a study or a new approach actually says anything new about the existing society becomes less important than if the approach has an internal intellectual logic; if it is elegantly developed as a picture puzzle. When a tradition prevails, where truth as an "evaluation tool" looses some of its importance,

since different approaches can coexist, we suggest that the creative climate suffers, since the elements of risk-taking and challenge shrinks.

Another explanatory factor of equal importance is the part played by leadership or management. The importance of leadership is strongly emphasized in the research on company organisation and innovation. A striking fact is the active and deliberate aim of the management in successful companies to create a climate of innovation:

> Top management's concern with innovation seems to be vivid. This has to do with the close link between company strategy and innovative approach, apparent especially in company C.[102]

Vedin, who studied highly innovative electronic companies, states as well that several of the successful companies had tried various organisational settings throughout the years, in order to vitalise and to find the very best organisation for a creative climate.[103]

In their studies, Deal and Kennedy as well as Sjölander came to similar conclusions concerning the part played by leadership.[104] Ekvall has also showed much interest in the question of leaderhip in creative companies and organisations which he considers of great importance.[105] The extent to which leaders seem to act deliberately and actively in creating a positive climate is significant as is the amount of time devoted to questions of organisation.

Universities and university institutes have leaders too. But there seems to exist a striking difference in the way that leadership is performed in companies and at the university. Our impression is, rather, that there is a lack of deliberate and well-planned leadership at the universities, partly due to the fact that the spheres of decision are unclear, partly due to the traditions prevailing where self-guidance is strongly defended and leadership easily could be taken for control. Lars Beckman, Rector for the University of Umeå, has a similar view:

> Academic leadership might be needed today more than before. I believe that the times demand a strong leadership at universities at all levels, maybe mostly at the institutional level.[106]

Could it be that questions of organisation and creativity are discussed more often at institutes judged to be more creative? In other words, do the leaders of these institutes deliberately organise and entertain a creative climate and - of equal importance - have ideas about the factors actually fostering creativity, much like the leadership in the successful companies mentioned above? Maybe the similarities between companies and university institutes are greater than we at first suspected.

Conclusions

In this article, we have argued that the institutional framework is a crucial factor when discussing scientific creativity. However, organisation must be understood and approached from various angles: Both more fundamental, historical, elements of self-government and professionalisation as well as different scientific traditions and organisational questions like leadership must be taken into consideration.

We have also strongly emphasized the sofar almost neglected possibilities of comparing university organisations to innovative companies with respect to ways of handling ideas, creative climate and leadership.

To conclude, in our opinion creativity is not such an eludent phenomenon as is sometimes claimed. Several studies have shown that the difficulties are more a matter of definition than empirical. We believe one of the best ways to search for factors of crucial importance to creative performance is to study existing organisational settings.

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[5]Blau, Peter, **The Organization of Academic Work,** New York 1973 p. 190.
[6]Polanyi, Michael, "The Republic of Science. Its Political and Economic Theory", **Minerva,** volume 1,number 1 1962 p.58.
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[16]Deutsch, Karl W, Platt, John R, Senghaas, Dieter, "Appendix. Major Advances in the Social Sciences Since 1900: An Analysis of Conditions and Effects of Creativity", **Advances in the Social Sciences 1900-1980. What, Who, Where, How. Written under the Auspices of Wissenschaftszentrum Berlin June 1982,** (ed) Deutsch, Karl W, Markovits, Andrei S, Platt, John, Cambridge 1986.
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[18]Kuhn, Thomas, **The Structure of Scientific Revolutions** (second ed enlarged), Chicago1962/1970.
[19]Taylor and Barron 1963 p. 375.
[20]Prop 1989/90:90 Om forskning p. 17.
[21]Skoie, Hans, **Norden og samfunnsforskningen. En kort oversikt med vekt på forskningspolitisk utvikling i etterkrigstiden,** (The Nordic Countries and the Social Sciences), Rapport 3/90 NAVF kap 5.
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[23]Dahlström, Edmund, "Personliga funderingar kring den svenska sociologins utveckling under efterkrigstiden",(ed) Fridjonsdottír 1990 p. 57.
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[27]Skoie 1990 p. 38, Interview with professor Bert Bohlin who during most of the 80s were employed by the government as adviser in scientific matters, 1991-11-14.
[28]Skoie 1990 p.38.
[29]Csikszenmihalyi, Mihály,"Kreativitet och kulturell utveckling", (red)Klein 1990 p. 286. Cf Rothenberg, Albert, **The Emerging Goddess. The Creative Process in Art, Science, and Other Fields,** Chicago 1979 p X

where he writes:"I have defined creativity fairly strictly - the state or the production of something *both new and valuable* -(...)". See as well Pelz, Donald C, Andrews, Frank M, **Scientists in Organizations. Productive Climates for Research and Development,** New York 1966 pp.154-155."When we say a person´s work shows high creativity (or that the person is "creative"), it means that others have found his performance both *original* and in some way *useful*".

[30]Barron, Frank, **Creative Person and Creative Process,** USA 1969 p 25.

[31]Halldén, Sören, **Nyfikenhetens redskap. En bok om kritiskt tänkande inom vetenskapen och utanför,** (Tools for Curiosity. A book on critical thinking in science and outside), Lund 1980 p. 109.

[32]Barron 1969 p. 3.

[33]Csikszentmihalyi 1990 p. 293.

[34]Kuhn, 1962/1970.

[35]Amabile, Teresa M, **The Social Psychology of Creativity,** New York 1983 p. 32. Amabile has performed many investigations using the method of experts judging. Frank Barron, another pioneer in the study of creativity, also used the method of letting "experts" singling out the creative products or persons. See for example his **Skapandets psykologi** (The Psychology of Creativity), Stockholm 1968. He calls it the "assessment method".

[36]Barron 1969 p. 9.

[37] In 1950, J P Guilford held an address at the American Psychologic Congress where he urged his collegues to devote more research to creativity.

[38]See e g Barron 1968 p 67, Barron 1969.

[39]Czikszentmihályi, Mihályi,"The Domain of Creativity", **Theories of Creativity,** (ed) Runco, Mark A, Albert, Robert S, Californa 1990 p. 193pp.

[40]Cattell, R B, Drevdahl, J E, "A Comparison of the personality profile (16 p.f.) of eminent researchers with that of eminent teachers and administrators, and of the general population", **The British Journal of Psychology,** volume XLVI, 1955.

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[44]Poincaré, Henri, **Science and Method,** p.52-53.

[45]Smith, Gudmund, **Upplevande och verklighet** (Experience and Reality), Lund 1986, chapter 7.

[46]Smith works with a different technique to test creativity than what is commonly used. Through a perceptgenetic technique the persons tested are exposed for a longer and longer period to a picture they are supposed to interpret. The openness of the interpretations and the degree to which the interpretation are dependent on knowledge of the real motive of the picture indicates more or less degree of creativity.

[47]Ibid p. 128pp.

[48]Amabile, Teresa M, **The Social Psychology of Creativity,** New York 1983, -"From Individual Creativity to Organizational Innovation", **Innovation - A Cross-disciplinary perspective,**(ed) Grónhaug, Kjell, Kaufman, Geir, Oslo 1988, - "A Model of Creativity and Innovation in Organizations", **Research in Organizational Behaviour,** volume 10 1988, - "Within You, Without You: The Social Psychology of Creativity and Beyond",**Theories of Creativity,**(ed) Runco, Mark A, Albert, Robert S, California 1990.

[49]Amabile 1983 p.3.

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[52]Björklund, Stefan, "The Research Connection", **Studies in Higher Education and Research,**(ed) Nybom, Torsten, 1990:1 p. 3. Björklund refers to some recently published results on learning seemingly parallell to some of the findings in Amabile´s research and writes:"No matter how one organises the teaching situation, examination or external motivation, effective learning can only occur if there is a particular internal motivation" (p3).

[53]Amabile 1983 pp103-117.

[54]Pelz & Andrews 1966 p. 27 and chapter 5.

[55]Polanyi, Michael, **Personal Knowledge. Towards a Post-Critical Philosophy,** New York 1958 p. 143.

[56]Fridjonsdottír, Katrin, **Vetenskap och politik. En kunskapssociologisk studie,** (Science and Politics) Lund 1983 kap 11, m.fl.

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[60]Ibid p. 119.
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[71]von Sydow 1989 p. 201.
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[83]Beckérus, Åke, Edström, Anders, **Doktrinskiftet. Nya ideal i svenskt ledarskap,**(Change of doctrine. New ideals in Swedish Management), Stockholm 1988 11pp. The citation is a slightly modified version of the original text.
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[85]Vedin, Bengt-Arne, **Corporate Culture and Creativity Management,** Lund 1985.
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[87]Ibid p. 62. Cf Morgan 1989 p. 157pp.
[88]Deal, Terrence, Kennedy, Allan, **Corporate Cultures,**New York 1982 see e g p 18.
[89]Sjölander, Sören,**Innovation och företagsförnyelse. Idéutveckling och idéhantering i företag,**(Innovation and Renewal in Companies), Stockholm 1983 p. 126. Other studies focusing climate or culture within companies are e.g. Peters, Tom, Waterman, Robert H Jr, **På jakt efter mästerskapet. Vägen till det framgångsrika företaget,** (In Search of Exellence), Stockholm 1985, Alvesson, Mats, **Ledning av kunskapsföretag.Exemplet Enator,** (Managing "Professional" Companies), Stockholm 1989 chapter 7, Ekvall, Göran,Arvonen, Jouko, Nyström, Harry, **Organisation och innovation. En studie av fyra divisioner vid EKA Kemi i Bohus,**(Organisation and Innovation), Lund 1987, Ekvall, Göran,**Förnyelse och friktion. Om organisation, kreativitet och innovation,** (Renewal and Friction),Stockholm 1988 pp 43-57, Ekvall, Göran, **Idéer, organisationsklimat och ledningsfilosofi,**(Ideas, Climate of Organisation and Management Philosophy), Stockholm 1990, Tollgerdt-Andersson, Ingrid, **Framgång eller motgång? En utmanande analys av svenskt ledarskap?,**(Success of failure?), Stockholm 1990 chapter 7.

[90]Ekvall ,1990, p. 20.
[91]See Ekvall 1987, 1988 and 1990.

[92]Ekvall, Göran, Tångeberg-Andersson, Ylva,"Working Climate and Creativity: A Study of an Innovative Newspaper Office", **Journal of Creative Behaviour,** 20:1986, where the same study is made within a newspaper office.
[93]Ekvall, Arvonen, Nyström 1987 where they focus on the Swedish company EKA characterised by sections differing very much from each other with respect to innovative ability.
[94]Nyström, Harry, **Creativity and Innovation,** Chichester, 1979 p. 1.
[95]Ekvall, 1990, pp 24-25.
[96]Ibid p. 27.
[97]Sjölander, 1983, pp 64-66, Morgan, 1989, pp 143-148.
[98]Morgan ,1989, p. 145.
[99]Stinchcombe, Arthur L, **Information and Organizations,** University of California Press 1990 p. 317.
[100]Andersson 1987 p. 80.
[101]Ibid p. 81.
[102]Vedin 1985 p. 43.
[103]Ibid p. 63.
[104]Deal-Kennedy 1983 p. 23,35 Sjölander 1983 p.40.
[105]Ekvall 1990 chapter 3, Ekvall-Arvonen-Nyström 1987 p 74-92.
[106]Beckman, Lars,"Akademiskt ledarskap - behövs det?" (Academic leadership -is it needed?), Ottoson (red), 1987 p. 75.